Urban Legends & Field Tests: Larval mosquito control in Tucson

Elizabeth Willott, Virginia Harpold, Tim Dennehy

Entomology Dept, University of Arizona

And

Nancy Laney, Ralph Wahl, Roberta Cook, Tucson Botanical Gardens

The problem

- Plenty of mosquitoes
- Plenty of advice from many different sources—extension bulletins, ads, on-line chat-rooms, etc.
- Plenty of misleading advice ….

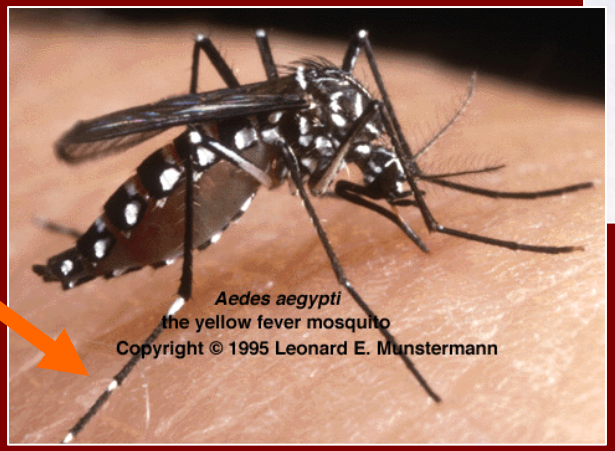
So,
What works? What doesn't?

Addressing that requires addressing

- The mosquitoes
- The people
- The products and procedures

Residential Areas (Tucson)

- ***Aedes aegypti***
  - Black & white (with lyre)
  - Bands on legs
  - Ankle-biter
  - Bites during day
  - Able to transmit dengue



- ***Culex quinquefasciatus***
  - Non-descript brown
  - No bands on legs or proboscus
  - More bites dusk to dawn
  - In yards and near larger bodies of water
  - Able to transmit West Nile
  - In Tucson, feeds mainly on humans and birds

Pictures by Russell: http://www.arbovirus.health.nsw.gov.au/mosquit/photos/mosquitophotos_culex.htm#quinq
Pictuer by Munstermann: http://klab.agsci.colostate.edu/aegypti/aegypti.html

Simple solutions

The No-Brainers:

- Remove point sources
- Flush point sources:

  bird baths, tarps, etc.
- Screening
- Fish

Simple solutions

The No-Brainers:

- Remove point sources
- Flush point sources:

  bird baths, tarps, etc.
- Put screen on water barrels, etc.
- Add fish to ponds

  (and keep checking...)

Simple solutions

What helps keep mosquitoes away for longer …

People go on vacation

What to do about water pooling where neighbor's cooler is bleeding and monsoon rains have saturated the ground?

The People

1. Avidly interested. Volunteer to help. Build channels and berms in public right of ways and alleys. Educate neighbors.
2. Don’t see mosquitoes as their issue or—and this may be important—have given up.
3. Get minimally interested—after mosquito season has begun.

The Ideal Product

- Works—Kills larvae and pupae
- Works *specifically*—Creating a "bug-free backyard" ought to be no-one's goal
- Aesthetically acceptable
- Easy and safe to apply; inexpensive
- Lasts a considerable length of time

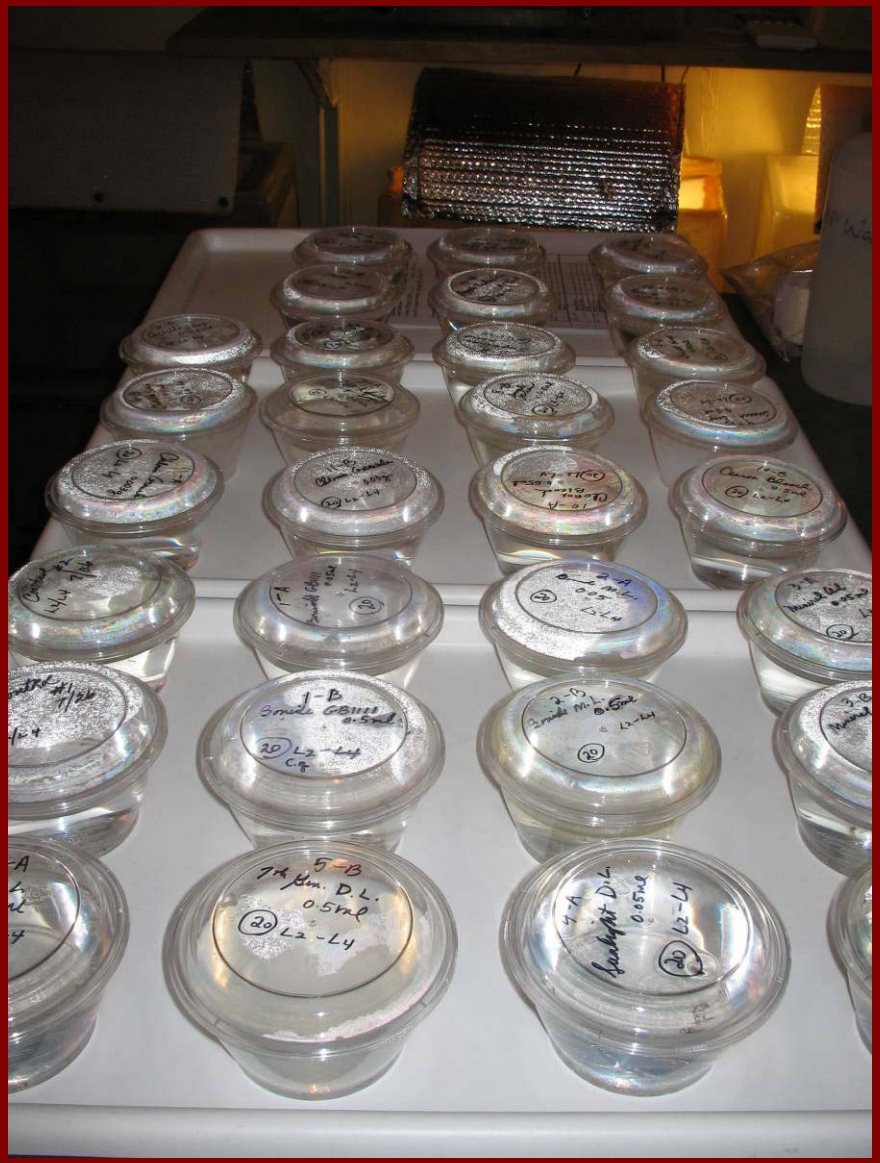
Larvicide Testing

AIMS:

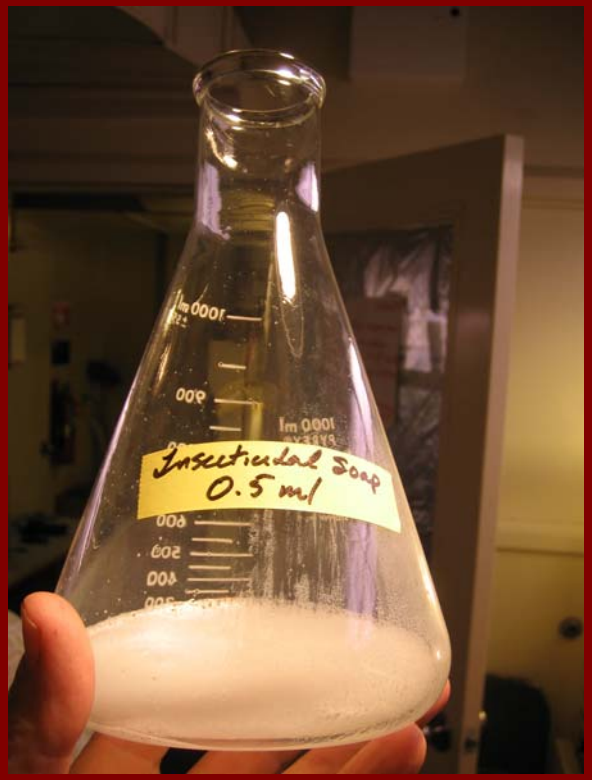
- Identify the potentially promising larvicides for residential use. Eliminate ones that have undesirable traits for this setting. Dismiss urban legends.
- Estimate relative efficacy of better larvicides against small and large larvae.
- Estimate duration of effectiveness of *Bt* treatments in small outdoor pools.

Bioassays of larvicides

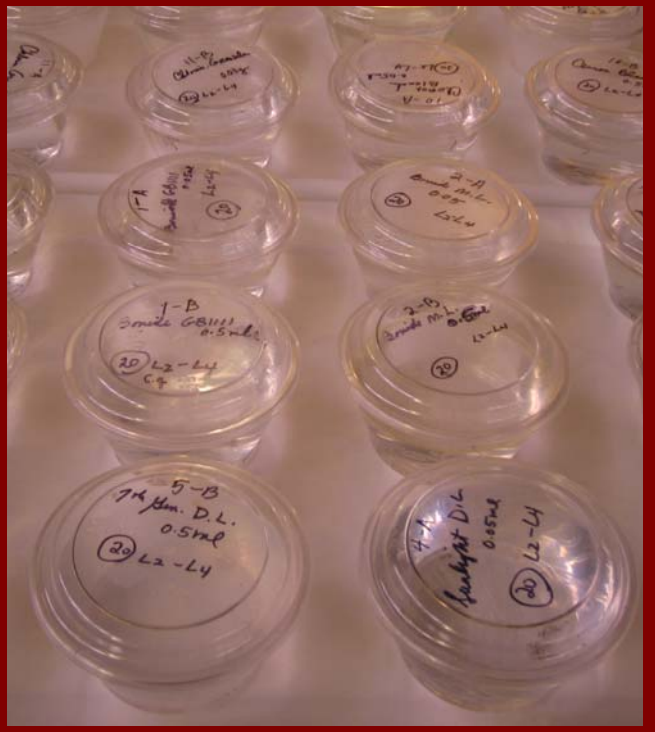
- 130 ml water
- 20-30 larvae per cup
- Evaluate mortality after 4 days



Visual Characteristics of Key Treatments



Shake Test for Foaming



Evaluation of Turbidity, Sheen, Scum

Tier I Testing—Vegetable Oils

Canola Oil (liquid)
Canola Oil (Spray)
Corn Oil
Olive Oil
Peanut Oil
Safflower Oil
Soybean Oil

Neem Oil

Larvicidal Efficacy

Undesirable Appearance

No → **Yes**

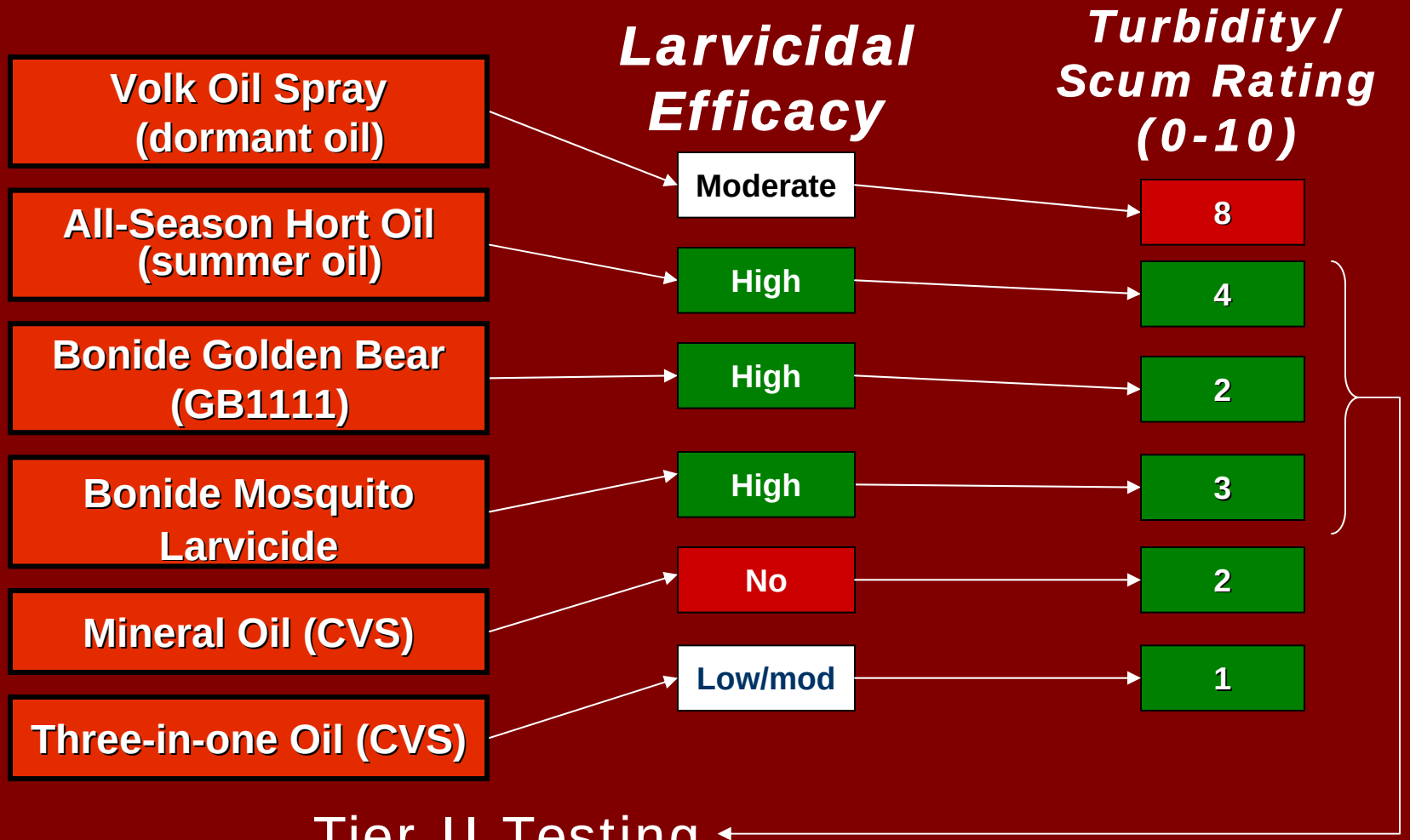
Moderate → **Yes**

No More Testing

Dennehy, Willott & Laney 2007

Testing—Petroleum Oils

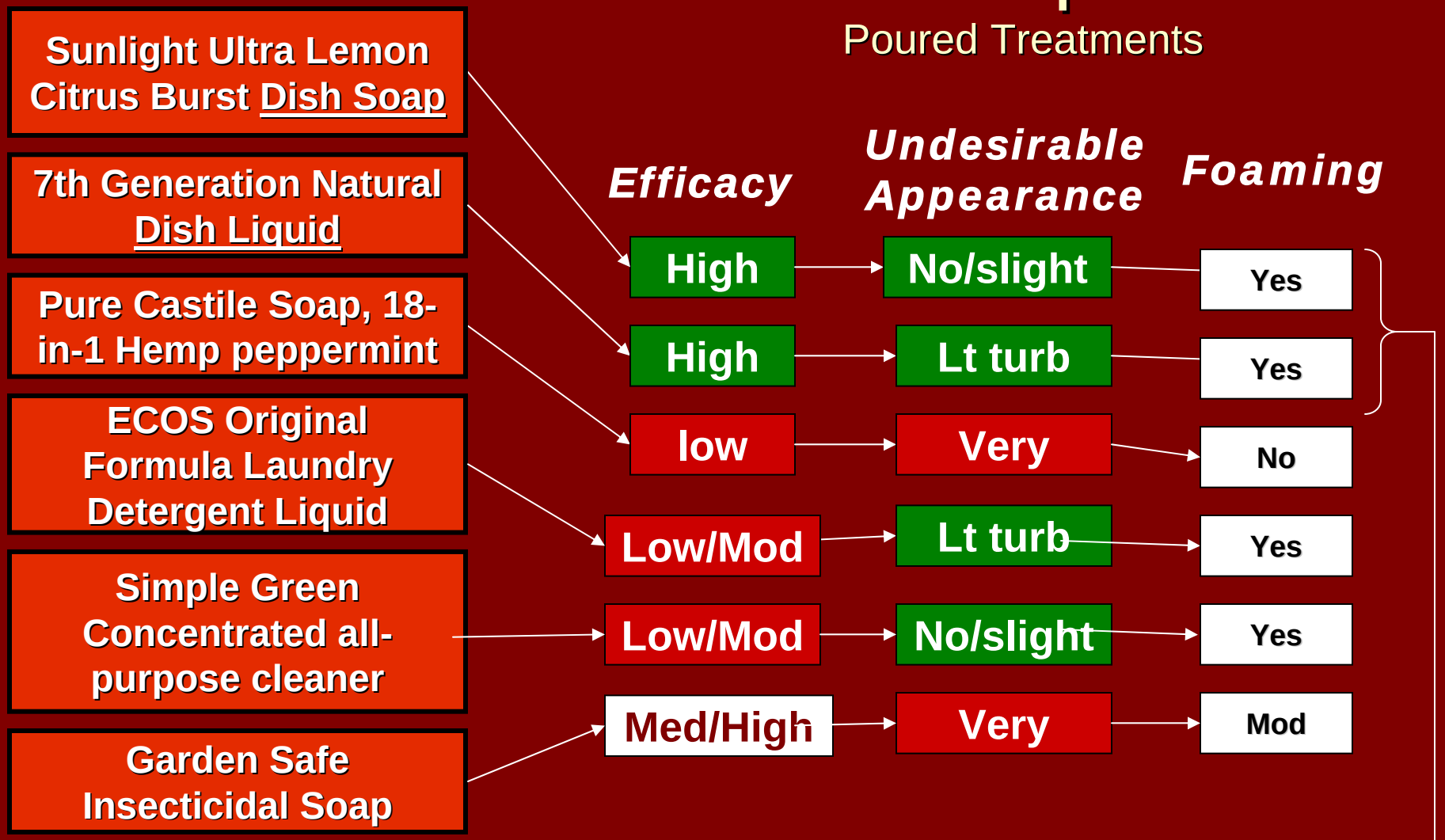
Poured Treatments



Dennehy, Willott & Laney 2007

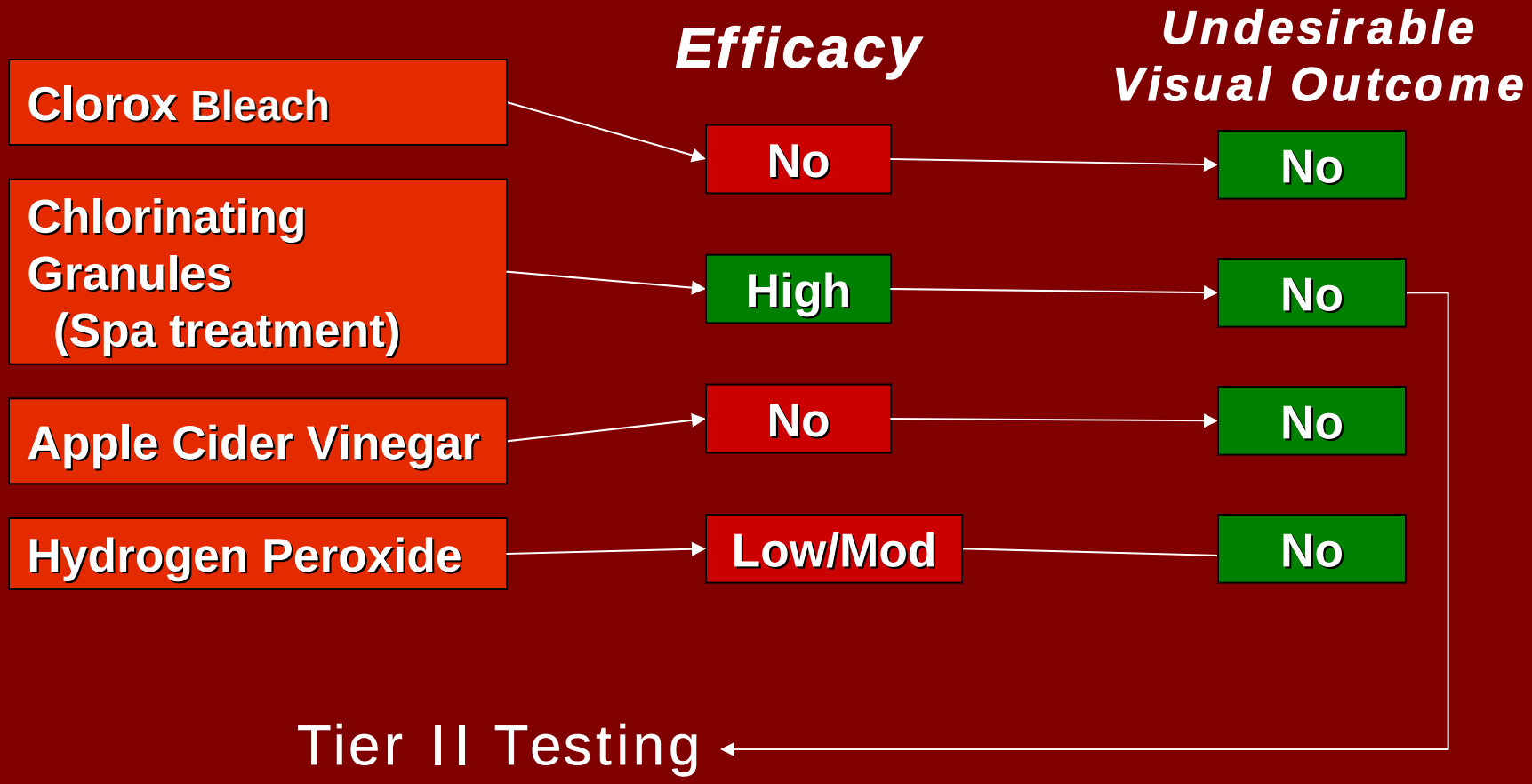
Tier I Testing—Soaps

Poured Treatments



Dennehy, Willott & Laney 2007

Tier I Testing—Oxidizers and Acids



Dennehy, Willott & Laney 2007

What Didn’t Work Well

Vegetable oils
Mineral oil
Laundry detergents
Vinegar
Bleach
Simple Green
Several insecticidal soaps and oils

Dennehy, Willott & Laney 2007

What Worked Reasonably Well and People Likely Already Have

Sunlight Dish Detergent

We tested Ultra lemon citrus burst

7th Generation didn't work as well

Chlorinating Granules

Agnique

All Season's Summer Oil

Bonide

Bt granules—numerous sources

Dennehy, Willott & Laney 2007

Bt concerns

In the lab:

- effective out to 42 days

In the "wild" (roof of Forbes Bldg in 100 gallons water in kiddie pools)

- major decline within 1 week

Dennehy, Willott & Laney 2007

Altosid and Agnique

- Stable out to at least 3 weeks

Altosid
-no dead bodies! So limited satisfaction!

Agnique
-available in small enough amount

Dennehy, Willott & Laney 2007

One Scenario

- A squirt of Agnique and then some Bt for people inclined that way

- Dish detergent or chlorinating granules (though caution: don't know long-term effects of these on fountains, pumps, etc., but seems OK enough for some purposes)

Dennehy, Willott & Laney 2007

Other work

How long from egg-adult for *Aedes aegypti* and *Culex quinx*?

Matured eggs of Aedes aegypti < 7 days
Culex quinx from egg raft laid to adult > 7 days

Student repeating this work this summer

Dennehy, Willott & Laney 2007

Contact Info

Elizabeth Willott
Willott@u.arizona.edu

Acknowledgements

Tucson Botanical Gardens for hosting some of the work and volunteers

NSF-grant

U of A Integrated Pest Management grant